

# Correlation of C-Reactive Protein and White Blood Cell Count with Histopathologically Proven Acute Appendicitis

## Faculty of Medicine, University of Misurata at period between January 2025 to June 2025

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| Article information                                                                                                                                                                                                                        | Abstract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <p><b>Key words</b></p> <p>Acute appedicities, perforated appedicities, diagnostic accuracy, WBC count, CRP, histopathology.</p> <p><i>Received: 30-04-2026</i></p> <p><i>Accepted: 30-04-2026</i></p> <p><i>Published: 13-05-2026</i></p> | <p><b>Background:</b> Acute appendicitis is a common surgical emergency. Laboratory markers like white blood cell (WBC) count and C-reactive protein (CRP) are widely used for diagnosis. This study evaluates the diagnostic performance and correlation of WBC and CRP with histopathology.</p> <p><b>Methods:</b> A Retrospective study was conducted at Misrata medical Centre (mmc) from January 2025 to June 2025 for 72 patients who underwent appendectomy. Histopathology served as the gold standard and cases were grouped as: normal appendix (n = 17), suppurative (n = 48), and perforated (n = 7). Preoperative WBC and CRP were recorded as “raised” or “not raised” using the local laboratory cutoffs used in the treating institution. Diagnostic performance measures (sensitivity, specificity, PPV, NPV) were calculated for WBC and CRP against histopathology.</p> <p><b>Results:</b> Of 72 patients, 17 (23.6%) had normal appendix, 48 (66.6%) suppurative appendicitis, and 7 (9.7%) perforated appendicitis. WBC sensitivity was 78.18% and specificity 82.35%; CRP sensitivity was 74.54% and specificity 70.58%.</p> <p><b>Conclusion:</b> Both CRP and WBC show significant correlation with histopathology, with WBC showing slightly superior diagnostic performance. Combined marker use increases diagnostic accuracy</p> |

## I) INTRODUCTION:

Acute appendicitis (AA) remains one of the most frequent causes of emergency abdominal surgery worldwide. Early diagnosis is essential to reduce morbidity and prevent complications such as perforation. While imaging modalities aid diagnosis, laboratory markers remain essential, especially in settings with limited radiology access (1).

Most AA patients first exhibit fever, nausea, or vomiting, and pain in the right iliac fossa. These are general symptoms that can be imitated by several different illnesses. (2)

Most of the diagnosis is made based on clinical evidence. White cell count (WCC) and C-reactive protein (CRP) levels are two examples of laboratory tests that clinicians use in addition to a thorough history and clinical examination to increase diagnostic accuracy; nevertheless, both inflammatory markers are non-specific. (3)

CRP was discovered in 1930 and is thought to be an acute phase protein that has been investigated as an inflammatory screening tool. After the tissue injury, within four to six hours, there is noted production of CRP with a peak sensitivity at 24 to 48 hours after the onset of the inflammatory event. WCC and CRP are simple laboratory tests that are cheap, readily available, and carried out routinely (2).

WBC rises early in inflammation while CRP rises later and correlates with disease severity (2).

Recent studies suggest combining these markers enhances diagnostic reliability (3;5). While Histopathology remains the gold standard for confirming acute appendicitis (5).

## II) Methodology

A retrospective analysis of 72 patients who underwent appendectomy for suspected acute appendicitis. WBC and CRP values were collected pre-operatively and compared to postoperative histopathology.

Cases categorized as: normal appendix (n=17), suppurative appendicitis (n=48), and perforated appendicitis (n=7). Diagnostic performance was calculated using standard formulas.

Preoperative laboratory markers were recorded as “raised” or “not raised” using the laboratory’s reference cutoffs. (WBC >  $10 \times 10^9/L$ , CRP > 10 mg/L).

## III) Inclusion and exclusion criteria

Inclusion: patients who underwent appendectomy with available preoperative WBC and CRP values and a histopathology report.

Exclusion: appendectomies performed incidentally during other procedures, missing laboratory or pathology data, or preoperative antibiotics that could significantly alter blood markers.

## IV) Results

| Marker | Sensitivity | Specificity | PPV    | NPV    |
|--------|-------------|-------------|--------|--------|
| WBC    | 78.18%      | 82.35%      | 93.47% | 53.84% |
| CRP    | 74.54%      | 70.58%      | 89.13% | 46.15% |

Table 1 :Diagnostic Accuracy of WBC and CRP



## V) Discussion:

AA is a common surgical condition. The current incidence is 5.7 per 100 000 per year with a peak between 10-30(1,2,8) Diagnosis is predominantly clinical and to improve its diagnostic accuracy, several scoring systems have been advocated to aid in early diagnosis and prompt management.

CT abdomen and US imaging is not routinely done in our setting as they are not always available, but when in diagnostic doubt the patient is usually booked for a US first; if that is still not conclusive, then a CT is requested.

Diagnostic laboratory work-up should include a WCC and CRP routinely in patients with suspected AA, Research indicates that these inflammatory markers exhibit different levels of sensitivity and specificity (4:5).

Various adult cohort studies have demonstrated that these biomarkers possess high sensitivity and specificity, which has reduced the reliance on imaging for assessing acute appendicitis (AA).

A study conducted in South Africa by Withers et al. involving a pediatric population found that a C-reactive protein (CRP) level greater than 10 mg/l is a strong indicator of AA, effectively distinguishing between complicated and uncomplicated cases (9).

This finding contrasts with our results which demonstrates significant correlation between inflammatory markers and histopathologically proven appendicitis.

WBC showed superior diagnostic accuracy over CRP, consistent with previous research (Kumar et al., 2023; Mohamed et al., 2024). CRP remains valuable particularly in detecting severe and complicated appendicitis (4).

Negative appendectomy rate was 23.6%, within global range of 10–25% (3). Combining markers improves diagnostic accuracy and clinical decision-making, aligning with modern diagnostic guidelines (1:9).

A 2022 systematic review/meta-analysis concluded that CRP values (especially higher cutoffs such as  $\geq 50$  mg/L) can be useful for ruling in appendicitis, but single biomarkers are limited and perform better when combined with clinical scoring systems. Our findings of moderate CRP sensitivity and specificity mirror this conclusion. (6)

Recent 2023–2024 cohort studies and institutional series report similar trends: WBC is a sensitive early marker, CRP tends to rise with disease progression and complicated appendicitis (i.e., perforation), and combined use improves diagnostic accuracy.

For instance, an analysis in 2024 showed that combination WBC+CRP improved discrimination versus either test alone. (7)

#### **VI) Conclusion:**

Both WBC and CRP are reliable biomarkers in diagnosing acute appendicitis. WBC shows slightly higher accuracy, while CRP helps identify complications. Using both markers in combination enhances diagnostic precision. Histopathology remains the gold standard.

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